

A System Engineering Approach to Strategic Partnership Development: A pilot study with NASA's Orbiting Carbon Observatory-2 (OCO-2) and the National Laboratory for Agriculture and the Environment (NLAE)

Authors:

Karen Yuen, Jet Propulsion Laboratory (JPL), California Institute of Technology
Dr. Ralph Basilio, Jet Propulsion Laboratory (JPL), California Institute of Technology
Dr. Jerry Hatfield, National Laboratory of Agriculture & the Environment (NLAE)
George Chang, Jet Propulsion Laboratory (JPL), California Institute of Technology
E. Lucien Cox, National Aeronautics and Space Administration (NASA)

American Geophysical Union Meeting Fall, 2017

Session: Science to Action: Building Novel and Transformative Partnerships Toward Decision-Relevant Science

Wednesday, December 13, 2017

A National Imperative Called Out

Earth observations from satellites and in situ collection sites are critical for an ever-increasing number of applications related to the health and well being of society. The committee found that fundamental improvements are needed in existing observation and information systems because they only loosely connect 3 key elements:

(1) the raw observations that produce information; (2) the analyses, forecasts and models that provide timely and coherent syntheses of otherwise disparate information; and (3) the decision processes that use those analyses and forecasts to produce actions with direct societal benefits.

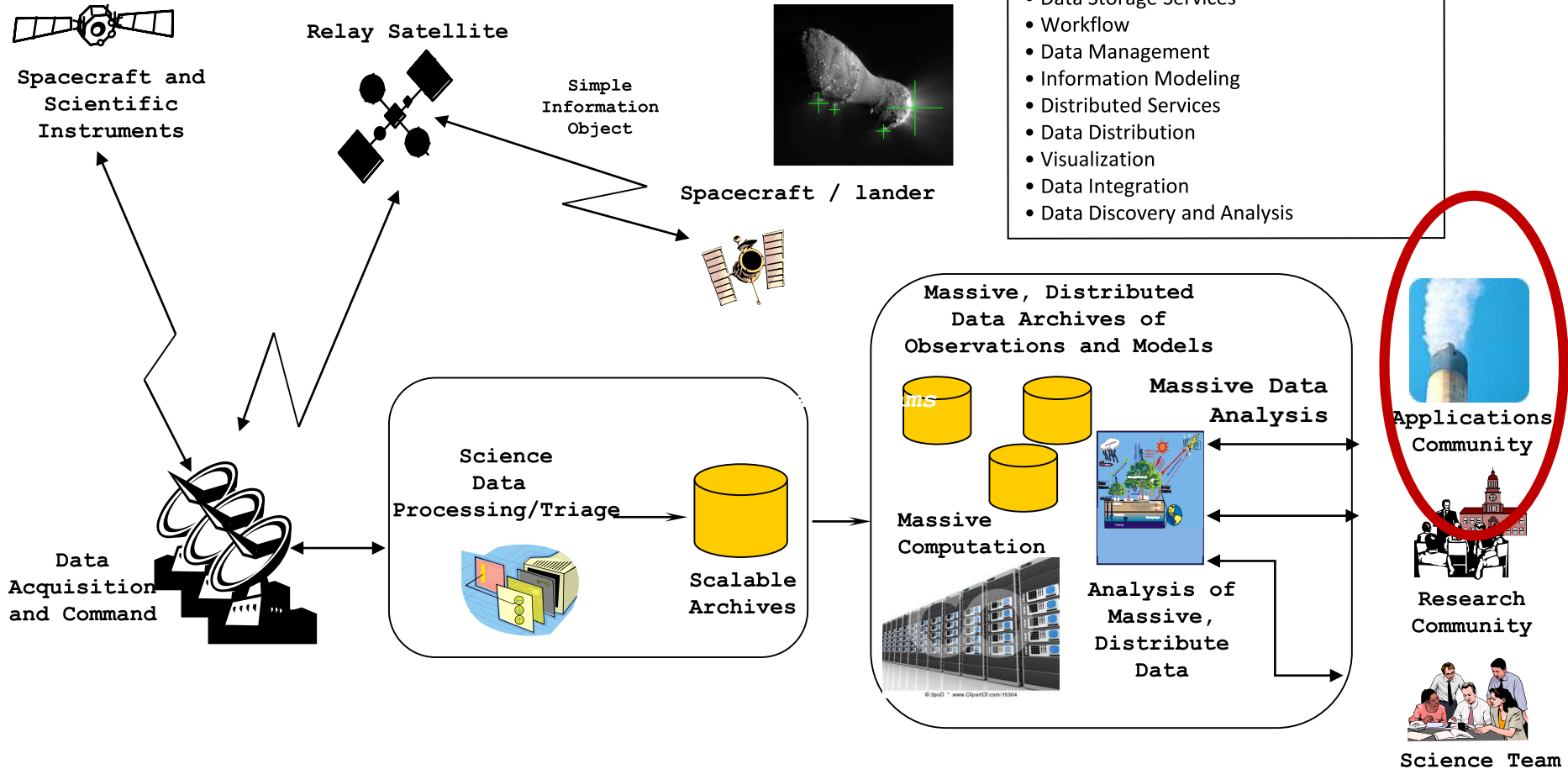
Taking responsibility for developing and connecting these three elements in support of society's needs represents a new social contract for the scientific community.

--Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond, 2007

End-To-End Data Lifecycle

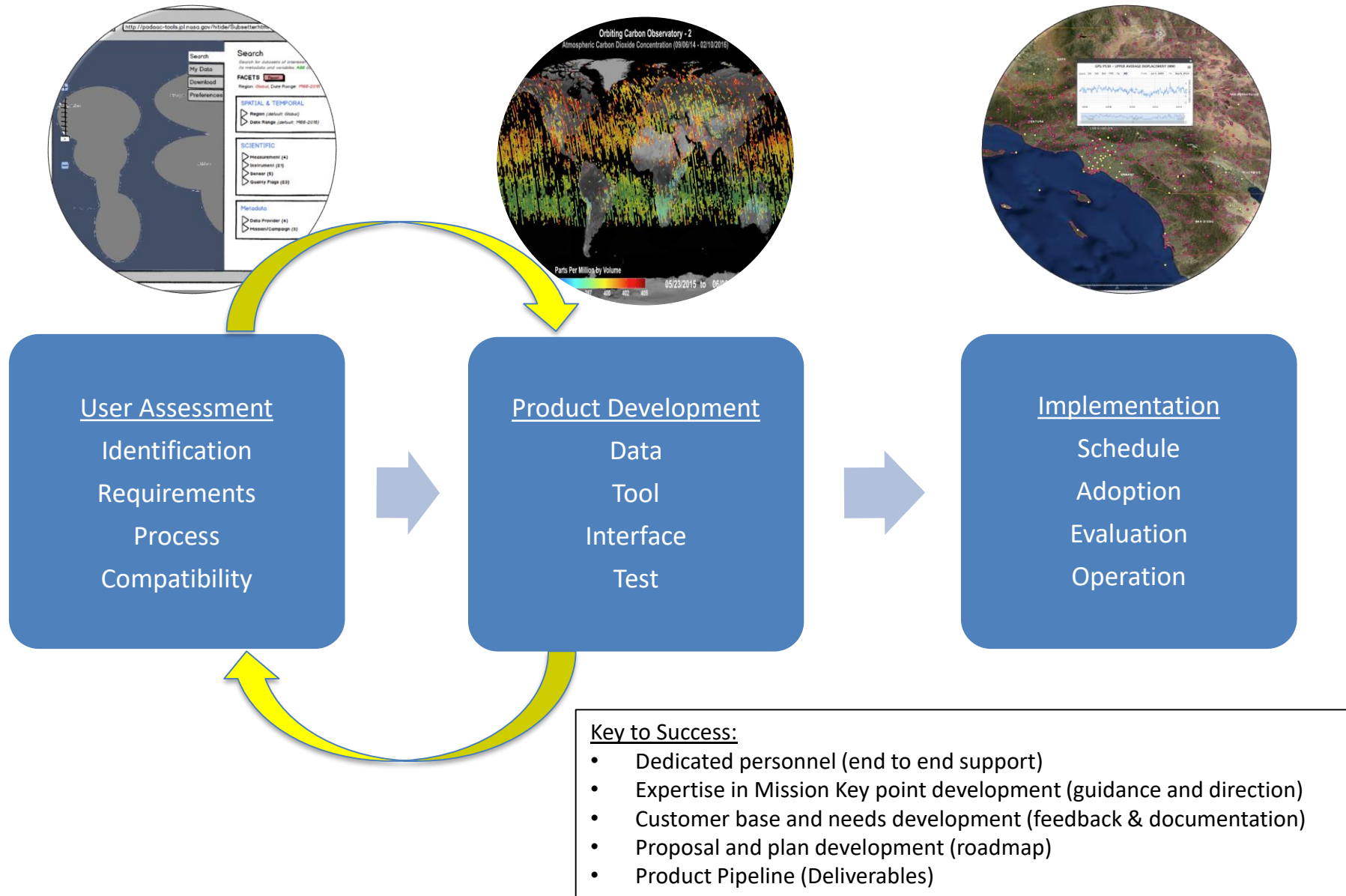
Rapid Turnaround
Science Planning
(ground- and flight-
based)

Onboard
Feature and
Event
Detection



Well planned and implemented process for data lifecycle that is not necessarily optimized for all the communities and users.

A System Engineering Approach



OCO-2 Science Data Application Development

Early Adopter and User Development (Years 2014-2016)

Apr 2014	OCO-2 1 st Applications Workshop (Pre-launch) Outcome: Set of potential applications and users to follow up
Jul 2 2014	OCO-2 Launch from VAFB
Sept 2014	Delivery of Final version of OCO-2 Application Plan
Dec 2014	Active Campaign to recruit Early Adopters
Jan 2015	Identify partner and discuss collaborative details
Mar 2015	MOU drafted
June 2015	MOU signed with NLAE/ARS/USDA
Sept 2015	OCO-2 2 nd Applications/1 st Users Workshop
Dec 2015	-Community Outreach Telecons and Meet up at AGU -SMAPVEX/CFIS campaign planning
Jan 2016	Initial science results discussion from 9/15 workshop
Mar 2016	Development of draft paper for RSE

User Assessment

Requirements

Process

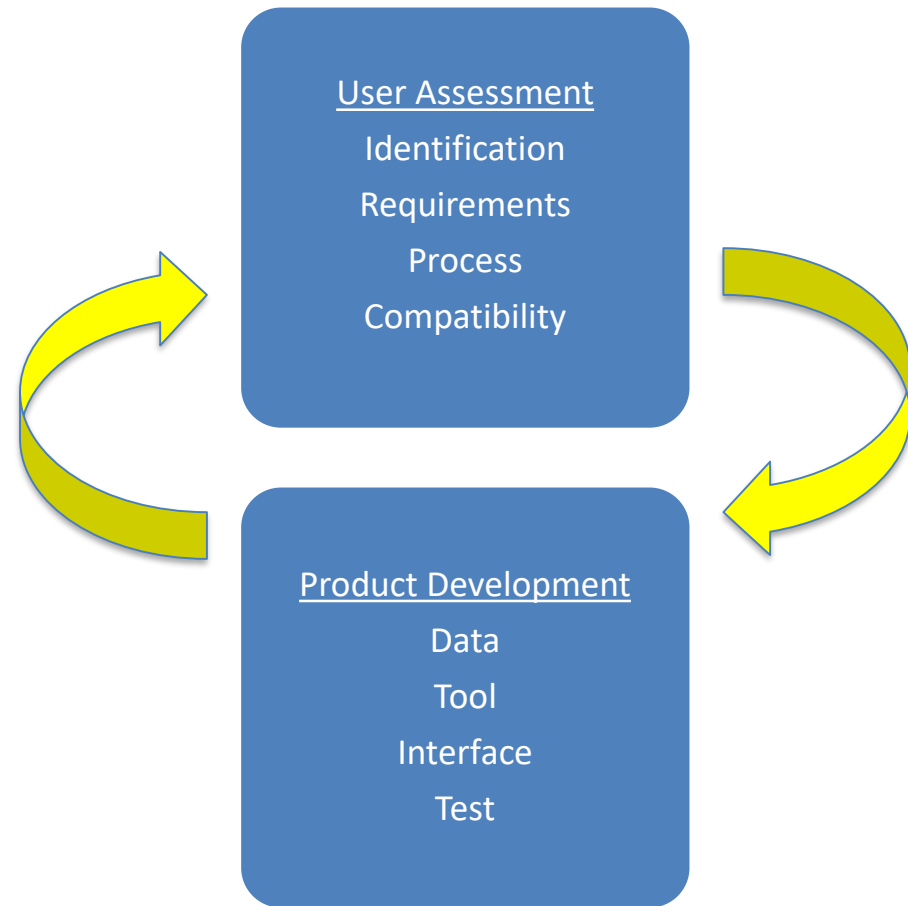
Obstacles

Compatibility

OCO-2 Science Data Application Development

Early Adopter and User Development (Years 2016-present)

Jul-Aug 2016	CFIS joins SMAPVEX 16 Campaign in N. Dakota, Nebraska, Illinois and Iowa
Sep 2016	3rd Science Data Application Workshop/2 nd Users Meeting, held at USDA HQ
Oct 2016	Progress report at OCO-2 Science Team Mtg
Nov 2016	RSE Paper published
Dec 2016	Post Workshop Mtg at AGU- Status Update
Jan 2017	OCO-2/OCO-3 Compatibility Study
Mar 2017	-Programmatic investment in further development -New User outreach
Jun 2017	-ESD signed Flight Directive for Applications Development -1 st Joint OCO-2/OCO-3 Science Data Application Meeting
Jul-Aug 2017	CFIS Flight campaign
Sep 2017	Data Processed and Tower data/Satellite data analysis commenced
Oct 2017	Proposed developed product and ingestion with current models and products



Feedback loop in real time!

Summary

- 1) Recognition and acceptance that not all data users are alike.
- 2) There is a need to customized approach, but the steps in the approach should be clear and methodical.
- 3) Active and consistent communication is essential for progress.
- 4) This is a time investment that will have long term pay off (e.g. OCO-3).

OCO-2 observations and data open up new possibilities for assessment of agricultural systems through both the CO2 and SIF data.

These are measurements we have not had at a large scale to compare to our flux tower data, to determine how information can be linked to provide a more robust estimate of global productivity.

- Dr. Jerry Hatfield

Director of National Laboratory for Agriculture and the Environment, USDA

Thank you!

For more information, feel free to contact me:
Karen.yuen@jpl.nasa.gov